U.PORTO

MASTER DEGREE
FINANCE AND TAXATION

The effects of reducing the tax discrimination between debt and equity: the case of Belgian ACE

Camila da Costa Carreiras

M

2018

U.PORTO
FEP FACULDADE DE ECONOMIA
UNIVERSIDADE DO PORTO

The effects of reducing the tax discrimination between debt and equity: the case of Belgian ACE

Camila da Costa Carreiras

Dissertation
Master in Finance and Taxation

Supervised by
Supervisor: António Cerqueira
Co-Supervisor: Elísio Brandão

2018

Biographical note

Camila da Costa Carreiras was born in Viana do Castelo, Portugal, on 21th of September 1995.

Her academic education started in September 2013 when she initiated a Bachelor´s course in Economics at the School of Economics and Management of the University of Porto that was completed in 2016. In September of the same year, after completing her Bachelor´s course, she continued her studies by starting the Master in Finance and Taxation at the same institution.

Acknowledgements

The realization of this work was made possible due to the support of many people, whom I want to thank.

First, I would like to thank my supervisors, PhD Professor António Cerqueira and PhD Professor Elísio Brandão, for the guidance they gave me in elaboration of this dissertation.

Secondly, I also want to thank all the professors I have had throughout my academic life, especially the professors of this master, for all the shared knowledge that will be essential during my life.

In addition, it is important to express special thanks to my colleagues in the Master of Finance and Taxation for their support in this journey of my life.

Finally, but foremost, is important to be grateful to my family, especially my parents, and my friends for always being present with patience and unconditional love.

Abstract

This work analyses the impact of the reduction of the tax discrimination between debt and equity on corporate capital structure decisions. For this we used an exogenous variation in Belgian tax legislation in 2006, called Notional Interest Deduction (NID), which consist of the introduction of a tax deduction for equity. To study the impact of this measure on corporate leverage we use a difference-in-difference regression which compares the evolution of the leverage ratio of the treatment and control group before and after the introduction of the NID. In addition, we used panel data and the estimator GLS cross-section weights. The data was collected from Thomson Reuters Datastream and sample includes Belgian (treatment group) and French (control group) companies for the period 2002 to 2011. The main results show that a more equal treatment of debt and equity change the corporate capital structure decisions, reducing leverage. This reduction is driven by a decrease in debt, principally due to a decrease in short-term debt, and not by an increase of assets. This result indicates that the reduction of corporate leverage is more likely to be driven by the NID.

Keywords

Allowance for Corporate Equity; Corporate capital structure; Corporate tax reform; Notional interest deduction

Resumo

Este trabalho analisa o impacto da redução da discriminação fiscal entre dívida e capital nas decisões de estrutura de capital das empresas. Para tal, utilizamos uma variação exógena na legislação fiscal belga, em 2006, designada de Notional Interest Deduction (NID) e que consistiu na introdução de uma dedução fiscal para o capital. Para avaliar o impacto desta medida na alavancagem das empresas utilizamos uma regressão de *difference-in-difference* que compara a evolução do rácio de alavancagem do grupo de tratamento e do grupo de controlo, antes e após a introdução do NID. Além disso, usamos dados em painel e um estimador GLS *cross-section weights*. Os dados utilizados foram recolhidos na Thomson Reuters Datastream para empresas belgas (grupo de tratamento) e francesas (grupo de controlo) para o período de 2002 a 2011. Os resultados principais mostram que um tratamento mais igualitário da dívida e do capital altera as decisões de estrutura de capital das empresas, diminuindo a alavancagem. Essa diminuição é impulsionada por uma redução da dívida, essencialmente devido à redução da dívida de curto prazo, e não pelo aumento dos ativos, o que torna mais provável que a redução da alavancagem seja impulsionada pela introdução do NID.

Palavras-Chave:

Allowance for Corporate Equity; Estrutura de capital; Notional interest deduction; Reforma fiscal corporativa

Index of Contents

Biographical note i
Acknowledgements ii
Abstract iii
Resumo iv
Index of Contents v
Index of Tables vi
1. Introduction 1
2. The Belgian Notional Interest Deduction 4
3. Literature Review and Hypotheses Development 6
3.1. NID and Capital Structure 6
3.2. Capital Structure Theories and Determinants 7
Profitability 8
Tangibility 9
Growth opportunities 9
Size 10
Non-debt tax shield (NDTS) 11
3.3. Crisis and Capital Structure 11
4. Sample, Variables and Methodology 13
4.1. Sample 13
4.2. Variables 13
4.3. Methodology 14
Difference-in-difference matching 15
5. Empirical results 17
5.1. Univariate results 17
5.2. Multivariate results 20
5.3. Robustness tests 23
6. Conclusion 26
References 28

Index of Tables

Table 1: Impact of the matching procedure and summary statistics 18
Table 2: Impact of the NID on capital structure 21
Table 3: Leverage ratio components 23
Table 4: Robustness tests.....25

1. Introduction

This work investigates whether the relative reduction of the tax discrimination between debt and equity has an impact on corporate capital structure. The subject of capital structure is particularly important because companies need resources to finance their investments and, consequently, they need to find the best finance option between debt and equity. This subject was originally studied by Modigliani e Miller (1958) who analysed the ways in which the company is financed and concluded that the type of financing does not influence its value. However, this theory was widely criticized because it was based on unrealistic assumptions, which led to its reformulation theory through the inclusion of taxes. In these new conditions, Modigliani e Miller (1963) have shown that taxes affect the capital structure, given that most tax systems consider the interests of debt as deductible costs for tax purpose, while this is not the case for dividends. In this way, it is more favourable for companies to use debt financing to finance their investment. After these works, the subject of corporate capital structure has been intensely debated in the world of corporate finance and the impact of taxes on capital structure is one of its old questions studied.

On the other hand, tax deductibility of interest expenses on debt may led to firms with excessive leverage, increasing the bankruptcy risk and their vulnerability in times of crisis. The recent financial crisis of 2008 showed the great fragility of the businesses, which led government authorities to give more importance to the reduction of leverage. Thus, fiscal reforms that intent to reduction the discrimination between debt and equity would help companies achieve an optimal capital structure without being exposed to higher risks in time of crisis (Zeitun et al (2017)). On that account, it is important to study the measures that try to align the benefits of debt and equity since they can also act as a tool to reduce leverage.

Therefore, the aim of this study is to analyse the impact of reducing the tax discrimination between debt and equity on the capital structure decisions of companies. For this we will use an exogenous change in the Belgian tax legislation in 2006 whose aim was to reduce the corporate leverage through a variation in the tax treatment of equity. This change was called the Notional Interest Deduction (NID) and led to the reduction the relative tax advantage of debt by creating a tax deduction based on the application of a fictitious interest on equity.

In the definition of the empirical model, we use the difference-in-difference setup, which compares the evolution of the leverage ratio of a group of Belgian companies that were

subject to the change in tax legislation with a group of control companies where the legislation did not change. For the empirical analysis we used panel data and the estimator Generalized Least Squares (GLS) cross-section weights. The sample is composed of accounting information of Belgian (treatment group) and French (control group) non-financial companies collected on Thomson Datastream and macroeconomic information collect on World Bank for the period 2002 to 2011.

This study contributes, on the one hand, to the literature on the impact of taxes on the capital structure and, on the other hand, to the literature that studies the implications of measures to reduce tax discrimination between debt and equity. Frist, we analyse the effect of the NID on capital structure choice to Belgian listed firms and extend the period of analysis from 2002 to 2011, which allows us to study the impact of the crisis on capital structure. Second, the implementation of this equity tax reform in Belgium, unlike other tax reforms, includes most of the basic and important features of the theoretical ACE system proposed by Devereux, M., Freeman, H. (1991), approaching a neutral tax system. Therefore, the study of NID implementation is an opportunity to empirically test this tax system proposed by theoretical literature. Third, the previous literature on the impact of taxes on capital structure focuses essentially on tax rate changes, but this study focuses on a direct policy toll. Thus, it provides important information for countries with high corporate leverage and to their regulators who are considering new policy measures to reduce leverage ratios.

The main results of this study show that the reduction of the tax discrimination between debt and equity have a significant impact on the corporate capital structure decisions. Thus, the introduction of the NID in Belgium have a negative impact on corporate leverage due to the reduction in debt attractiveness. Subsequently, we also analyse the factors that caused the change in leverage ratio. This analysis is important because companies can lower their leverage ratio by decreasing debt or increasing assets. The results indicate that the change in leverage is driven by a decline in debt, mainly due to the reduction of short-erm debt, and not by an increase of assets. Finally, we do additional robustness tests to evaluate if the main results do not depend on the matching procedure or the sample, which confirmed the findings.

The remainder of the dissertation is structured as follows. Section 2 provide the principal characteristics of the Belgian Notional Interest Deduction. Section 3 presents a summary review of the main related literature on NID and capital structure and develop our

hypotheses. In section 4, we describe the sample and present the variables definition and the methodology used. Section 5 describes our empirical results and provide some robustness checks. Finally, in section 6 we present the conclusion of our findings.

2. The Belgian Notional Interest Deduction

The generality of the tax systems around the world allows the deductibility for interest, while dividends are not. This situation can cause distortions in the financing decisions. Thus, these corporate tax systems favour debt financing over equity financing and may lead to excessive leverage by companies.

To mitigate this problem Devereux and Freeman (1991) proposed the implementation of a Allowance for Corporate Equity (ACE) based on the theorical concept of neutral tax system developed by Boadway and Bruce (1984) . Ideally an ACE system make firms indifferent regarding the debt-equity choice, at least for tax propose, because allows firms to deduct a notional interest rate on equity as well as an interest on debt (Schepens, 2016). Furthermore, an advantage of this system is it to be insensitive to the method of tax depreciation and inflation. For example, if the firm chose an accelerated depreciation method for tax purpose, the book value of assets decreases and, consequently, decreases the base on which ACE is calculated. Thus, the reduction in the ACE benefit is exactly offset by the benefits of accelerated depreciation (Geert Van & Tom Van, 2013). However, the main obstacle to the implementation of this type of system is a budgetary cost, estimated at around 15 percent of current revenue for a selection of advanced economies, according to De Mooij (2012). Some countries, both inside and outside Europe, have introduced an allowance for corporate equity, for example Croatia (1994-2000), Brazil (1996 to the present), Italy (1997-2003, having adopted again the system in 2011 to the present), Austria (2000-2004), Belgium (2006 to the present), Portugal (2008 to the present), Latvia (2009-2013), Liechtenstein (2011 to the present), Cyprus (2015 to the present), Turkey (2015 to the present) and Malta (2017 to the present)[1], although the systems were implemented differently for different countries. In addition, Denmark has proposed an ACE in 2017 budget to be introduced in 2019.

[1] Several studies focus on the application of the ACE system in these countries. Keen and King (2002) analyses the application of the ACE in Croatia. The system implemented in this country includes most of the characteristics of the theoretical model as developed by Devereux and Freeman (1991) as well the system implemented in Belgium. The Belgian system has been largely studied, for example by Andries, Cools, and Van Uytbergen (2017), Schepens (2016), Geert Van and Tom Van (2013), Kestens, van Cauwenbergeo, and Christiaens (2012) and Princen (2012). However, the system implemented in Brazil has different characteristics from the others. Its application is limited to dividends paid out to shareholders. Klemm (2007) analysed the impact of applying this system and found a significant change of the capital structure of Brazilian companies. Finally, Austria and Italy had more restricted variants of the standard ACE system. Bordignon, Giannini, and Panteghini (2001) studied the application of the system in Italy.

In Belgium, an Allowance for Corporate Equity was applied since 1 January 2006 (fiscal year 2007) by introducing a notional interest rate on equity called the Notional Interest Deduction (NID). The eligible firms for the application to this measure are the ones with tax presence in Belgium, which includes Belgian firms and foreign firms with subsidiaries in Belgium.

The introduction of the NID was boosted by the prohibition of the existence of coordination centres by decisions of the European Commission in 2003. Until then, Belgium had an advantageous tax legislation for multinational coordination centres, which made it a privileged tax destination for multinational firms and discriminated against Belgian firms. Therefore, the NID partly replaced the tax benefit for the multinational coordination centres. The two most important aims of this tax reform were to reduce the effective corporate tax rate, increasing the attractiveness of Belgium to foreign investors, and to reduce the traditional tax discrimination between debt and capital financing. As a result, it is expectable this reform encourages companies to reduce debt financing and increase capital financing, improving corporate solvency.

The amount of the tax deduction is calculated as a notional tax rate on the firm's adjusted equity. This notional interest rate is set annually by the Belgian Government and is equal to the average 10-year Belgian government bond rate of the second year prior to the current fiscal year[2]. In case of small and medium-sized enterprises, the notional interest rate is increased by 0.5% than standard rate. After calculating the amount of the NID, this is deducted from the taxable base for the calculation of corporate taxes. However, when a firm has an insufficient tax base to fully use the planned deduction, the unrealized part can be carried forward to the following seven years. Thus, the deduction corresponds an estimated equity cost and not to an actual equity cost, i.e. the return to shareholders (Schepens, 2016).

[2] For example, for the fiscal years 2007, 2008, 2009, 2010, 2011 and 2012, the applicable notional interest rate was equal to 3,442%, 3,781%, 4,307%, 4,473%, 3,8% and 3,425%, respectively.

3. Literature Review and Hypotheses Development

3.1. NID and Capital Structure

There are theoretical reasons that point out taxes affect the choices of the firm's capital structure (Miller, 1977; Modigliani & Miller, 1963). These theoretical studies inspired a set of empirical studies (e.g. Faccio and Xu (2015) and Rajan and Zingales (1995)), which established a solid statistical connection between taxes and capital structure choices.

The main goal of our study is to investigate the effect of NID application in Belgian companies. This application consists of the deduction of a notional interest rate on capital, which allows the reduction of the tax discrimination between debt and equity financing. According to trade-off theory of corporate capital structure, companies balance the costs and benefits related to debt[3], being the tax deductibility of debt one of the most important benefits. Therefore, the NID decreases the cost of equity and, consequently, reinforces the relative attractiveness of capital financing in comparison to debt financing (Geert Van & Tom Van, 2013). Thus, tax benefits of debt decrease, and companies incorporate less debt into their capital structure.

Since the introduction of the NID, some empirical studies have focused on the implications of the NID in Belgium. For example, Kestens et al. (2012) studied if the introduction of the NID induced changes in the leverage ratios of Belgian small and medium sized enterprises. They concluded the notional interest deduction caused a decrease in average simulated marginal tax rate and significantly reduced corporate leverage ratios. Geert Van and Tom Van (2013) also focused on small and medium enterprises and found an improvement in solvency but without a significant change in leverage. Another set of researchers used the difference-in-difference method, which compares the change in leverage of the treated group with the change in leverage of the group control, namely Princen (2012) and Schepens (2016). The first one compared the Belgium group reaction non-financial firms with a group of French and German firms and found a significant reduction in corporate leverage. Finally, Schepens (2016) studied the impact of the NID on capital structure of Belgian banks compared to a set of European banks and found a significant increase in the capital ratio of Belgium banks.

[3] For more details on the trade-off theory see section 3.2.

Therefore, we expect the introduction of the NID to have a negative impact on the leverage of Belgian firms. We will test the following hypothesis:

H1: The application of the NID has a negative impact on the leverage of Belgian firms.

3.2. Capital Structure Theories and Determinants

The theme of capital structure was originally studied by Modigliani and Miller (1958). They considered a set of assumptions, such as a perfect market and the absence of taxes, and concluded the way how the firm is financed does not influence its value. However, this theory was widely criticized for being based on a set of unrealistic assumptions. These criticisms led Modigliani e Miller in 1963 to reformulate their model by considering an economy in the presence of taxes where there is the possibility of tax deduction of financial charges with debt. In these new conditions, the authors concluded the tax deduction of interest, but not of dividends, encourages firms to increase the use of debt to finance their investments. Thus, the value of the firm is greater the higher the level of debt.

Following this theory, many studies have been developed and inspired different theoretical perspectives on the determinants of corporate capital structure. The two predominant theories in this area were the trade-off theory and the pecking order theory.

The trade-off theory considers an optimal capital structure which reflects a balance between the costs and benefits of debt compared to equity (Kraus & Litzenberger, 1973; Miller, 1977). Therefore, firms choose their capital structure considering the trade-off between the benefits and costs of using the debt, in other words they take into account the value of interest tax shields and the cost of bankruptcy or financial embarrassment expected with the increase in debt. If on the one hand, firms increasing debt will increase tax benefits, which should increase their value, on the other hand, financial costs and the risk of bankruptcy also increase triggered by this increased debt, eventually reaching the equilibrium (i.e. optimal capital structure) where the value of the company is maximized.

In contrast to the trade-off theory, in pecking order theory, it is not possible to establish a good relation between debt and equity and does not admit the existence of an optimal capital structure. This theory defends the existence of a hierarchy of preference by type of financing. First, firms prefer internal resources available to finance new investments. When

internally generated funds become insufficient, they use external funds in the following order: first debt and finally equity (S. C. Myers, 1984; Stewart C. Myers & Majluf, 1984). This hierarchy is justified by the existence of asymmetric information between firm managers (insiders) and outside investors. According to this theory, outside investors have less information about future prospects of the company than insiders, therefore outside investors may underestimate the true value of the firm and, consequently, internal resources are preferable to financing new investments.

The different theories of capital structure suggest a set of firm-specific factors that may affect the choice between debt and equity, and many investigations focus on the effect of these different firm-specific determinants on the capital structure, for example: Faccio and Xu (2015); Harrison and Widjaja (2014); Alves and Francisco (2015); Zeitun, Temimi, and Mimouni (2017); Akbar, Rehman, and Ormrod (2013); Rajan and Zingales (1995); Titman and Wessels (1988). These firm-specific determinants considered are: profitability, tangibility, grow opportunities, size and not-debt tax shield, discussed below.

Profitability

Both theories, trade-off and pecking order, argue that profitability affects corporate financing decisions.

The trade-off theory holds profitability companies should be more leveraged. The more profitable companies have a lower risk of bankruptcy and may resort to a higher level of debt to reduce the tax payments. Thus, according to this theory there is a positive relationship between profitability and leverage.

In its turn, the pecking order theory suggests a hierarchy by types of financing where firms prefer internal funds to finance their new investments and only use debt when they are insufficient. Thus, companies with more internally generated funds will be less leveraged because they avoid funding through external capital to prevent problems of asymmetric information. Therefore, profitable companies will have less leverage, i.e. the pecking order theory suggests a negative relationship between profitability and leverage.

Most empirical studies also support a negative relationship between profitability and leverage (Akbar et al., 2013; Alves & Francisco, 2015; Faccio & Xu, 2015; Geert Van & Tom Van, 2013; Harrison & Widjaja, 2014; Kestens et al., 2012; Rajan & Zingales, 1995; Zeitun et al.,

2017). In line with this, we expect a negative relationship between profitability and leverage and, consequently, we will test the following hypothesis:

H2: Profitability has a negative impact on leverage.

Tangibility

The predominant type of assets in a company affects in some way its capital structure choice.

The trade-off theory supports a positive relationship between tangible assets and leverage (Rajan & Zingales, 1995; Titman & Wessels, 1988). In the case of bankruptcy, tangible assets are generally more likely to have greater residual value than intangible assets. This makes tangible assets a good collateral for debt contracts and works as an instrument that mitigates the risk which occurs in shareholder and bondholder conflict. Thus, companies with higher tangible assets has a lower risk of lending and creditors require a lower risk premium, which allows access to a higher level of debt. This positive relationship is supported by Geert Van and Tom Van (2013), Kestens et al. (2012), Faccio and Xu (2015), Harrison and Widjaja (2014), Alves and Francisco (2015), Zeitun et al. (2017) and Rajan and Zingales (1995).

However, the pecking order theory predicts firms with less tangible assets are more subject to information asymmetry problems and, consequently, they have more underinvestment problems (Harris & Raviv, 1991). This makes debt financing more attractive. Thus, this theory expects tangibility have a negative impact on leverage.

Therefore, we expect a positive relation between tangibility and leverage and we will test the following hypothesis:

H3: Tangibility has a positive impact on leverage.

Growth opportunities

The trade-off theory defends companies with high grow opportunities usually present higher financial distress and agency costs between shareholders and bondholders because these companies have higher asymmetric information problems (Rajan & Zingales, 1995; Titman & Wessels, 1988; Zeitun et al., 2017). This situation causes an underinvestment which can be mitigated by reducing deb. Therefore, there is a negative relationship between growth opportunities and debt.

In otherwise, firms with high grow opportunities need large amounts of funding and internal resources may not be sufficient to finance investment opportunities. Therefore, these firms may have to resort to external resources. Given the pecking order theory, when the firms need external financing first issue debt and then capital (Geert Van & Tom Van, 2013; S. C. Myers, 1984). In this way, growth opportunities are positively related to leverage.

The empirical studies that analyse the relationship between growth opportunities and leverage have contradictory results, while Faccio and Xu (2015), González (2015) and Akbar et al. (2013) find a positive association between the two variables, Harrison and Widjaja (2014), Alves and Francisco (2015), Zeitun et al. (2017) and Rajan and Zingales (1995) conclude growth opportunities are negatively related to leverage.

In conclusion, we will consider a positive sign supported by the previous theoretical exposition. In this way, we will test the following hypothesis:

H4: Growth opportunities have a positive impact on leverage.

Size

Rajan and Zingales (1995) suggest firm size may be an inverse proxy for the probability of bankruptcy.

Larger companies tend to be more diversified and to have less volatile earnings. Moreover, these firms are generally less likely to bankruptcy and can obtain financing easier with lower financial costs (Titman & Wessels, 1988; Zeitun et al., 2017). According to this, the trade-off theory consider larger companies will be more leveraged.

In its turn, the pecking order theory also suggest the existence of a positive relationship between size and leverage. Large companies are characterized by lower asymmetric information problems, providing more information to market players and, as a result, obtain more easily new financing from creditors (Geert Van & Tom Van, 2013).

The authors Princen (2012) and Rajan and Zingales (1995) found inconclusive results. (Princen, 2012) uses two measures of leverage (book leverage and financial leverage), finding a negative relation for the former and a positive relation for the latter. In addition, all countries analysed by Rajan and Zingales (1995) have a positive relationship between size and leverage, except to Germany where this relation is negative. However, many studies found a

positive relationship between these two variables (Alves & Francisco, 2015; Faccio & Xu, 2015; Zeitun et al., 2017). Considering the results described above, we will test the following hypothesis:

H5: Size has a positive impact on leverage.

Non-debt tax shield (NDTS)

The non-debt tax shield can be considered as a direct substitute for the tax benefits of debt financing. To examine this proposition, Geert Van and Tom Van (2013) and Titman and Wessels (1988) use depreciation and amortization as a proxy for non-debt tax shield. As depreciations and amortization reduces taxable income, companies with larger non-debt tax shields use less debt in their capital structure. de Miguel and Pindado (2001) prove this negative relationship for a panel of Spanish companies.

However, Titman and Wessels (1988) and Geert Van and Tom Van (2013) could not confirm the relevance of the effect of depreciations and amortizations on leverage. On the other hand, Princen (2012) and Faccio and Xu (2015) conclude firms with higher level of NDTS have a higher level of leverage in their capital structure. The last result is consistent with depreciations and amortizations as a proxy for assets. Thus, firms with high depreciations and amortizations should replace their assets more quickly, as a result, they need more debt to finance the replacement of assets (Bradley, Jarrell, & Kim, 1984).

Finally, we expect a negative impact of NDTS on leverage. So, we will test the following hypothesis:

H6: NDTS has a negative impact on leverage.

3.3. Crisis and Capital Structure

The financial crisis of 2008 was a global crisis which revealed a set of weaknesses that should not be neglected, namely the deregulation of financial markets and the deficiency of supervisory systems.

As most corporate income tax systems admit the deductibility of interest deduction, this favour debt financing. This encourages companies to increase the leverage ratio and may lead to excessive leverage. However, this situation makes increase the bankruptcy risk of the firms

and their vulnerability in periods of crisis. Thus, fiscal reforms that align the benefits of debt and equity would help attain an optimal capital structure without firms being exposed to greater risks during the crisis (Zeitun et al., 2017).

The recent financial crisis has been exposed to several empirical studies which suggest a significant impact of the crisis on corporate capital structure decisions, but they found evidence in both directions. Akbar et al. (2013) and Zeitun et al. (2017) found a negative impact and Alves and Francisco (2015) and González (2015) obtained a positive impact of the crisis on leverage ratio due to the increase in debt essentially by the increase of the short-term debt. If on the one hand, financial crises create conditions for supply shocks with a reduction in the availability and an increase in the cost of debt, which leads to the reduction of debt in corporate capital structure, on the other hand, crisis can have the opposite effect, increasing debt, because companies may need more financing due to lack of internal resources. Thus, the exact effects of the crisis on the capital structure of companies are partly unknown.

4. Sample, Variables and Methodology

4.1. Sample

The sample was constructed by firms-specific balance sheet data from the Thomson Reuters Datastream. We used Belgian firms listed on the Euronext Liffe Brussels (treatment group) and French firms listed on the Euronext Liffe Paris (control group) for the period from 2002 to 2011. The sample period is divided into a pre-treatment period of four years (2002-2005) and a post-treatment period of six years (2006-2011), of which the last four years include the post-crisis period (2008-2011). Thus, the initial sample include 2 281 firms with data for DS Mnemonic Code (310 Belgian and 1 971 French).

From the initial sample, we excluded: all companies without information for Sic Code; all financial companies (Sic Code 60-67) because they have specific financial behaviour as also a unique legislation; and all companies who do not have complete information for pre-treatment period[4] and for at least four years for the post-treatment period. Subsequently, we winsorized all variables at the 1% and 99% levels to mitigate the impact of outliers. As a result, the final sample covered 521 firms (66 Belgian and 455 French) with 5 210 firm-years observations (660 for Belgium and 4 550 for France).

Finally, the macroeconomic variables were obtained from the World Development Indicators database at the World Bank.

4.2. Variables

The dependent variable in the study is the leverage ratio (Leverage) defined as total debt divided by total assets. In a second analysis, we used the logarithm of total assets (Ln(Total Assets)), the logarithm of total debt (Ln(Total Debt)), the logarithm of long-term debt (Ln(LTD)) and the logarithm of short-term debt (Ln(STD)) as the dependent variable to analyse the underlying factors of the change in leverage ratios.

We used two types of explanatory variables: main variables and control variables.

The main explanatory variables of the analysis are defined as follows: Treated is a dummy

[4] It is necessary to have complete information for the pre-treatment period to be able to do the matching procedure.

variable equal to one for all Belgian firms and zero otherwise, indicating the treatment group; Post is a dummy variable equal to one for the post-treatment period (2006-2011), zero otherwise; Crisis is a dummy variable equal to one for the post-crisis period (2008-2011), zero otherwise.

Finally, we used control variables at macroeconomic and firm level. Thus, taking into account the literature on determinants of capital structure, we add the following firm-level variables: profitability (PROF) is defined as earnings before interest, taxes, depreciation and amortization (EBITDA) divided by total assets; tangibility (TANG) is defined as property, plant and equipment divided by total assets; size (SIZE) defined as the logarithm of total assets; non debt tax shield (NDTS), defined as depreciation, depletion and amortization divided by total assets. In addition, we have also introduced macroeconomics control variables to control for potential differences in economic development at the country level, such as: GDP per capita (GDPpc), GDP growth per capita (GDPpc growth) and Inflation as measured by the consumer price index. Finally, we use industry dummy variables based on two-digit SIC codes to control the industry-specifics characteristics.

4.3. Methodology

For the main analysis in this study, we used a difference-in-difference setup, which compares change in the capital structure of the Belgian companies with change in the capital structure of a similar control group, where tax legislation did not change. The base specification is as follows:

$$Leverage_{i,t} = \alpha + \beta_1 * Post_t + \beta_2 * Treated_i * Post_t + \beta_3 * Crisis_t + \beta_4 * X_{i,t} + \varepsilon_{i,t}$$

where i represents the individual companies, t the year, $X_{i,t}$ represents the set of control variables and the remaining variables have the above meaning. These set of control variables including profitability, tangibility, growth opportunities, size, NDTS, GDP per capita, GDP growth per capita and inflation. The coefficient of interest for the main analysis is the coefficient β_2 which indicate the impact of the introduction of the NID.

We estimate the model by using a Generalized Least Squares (GLS) cross-section weights to avoid possible heteroscedasticity problems due to the use of panel data.

Difference-in-difference matching

Ideally, the impact of a tax reform would be studied by comparing the changes in the relevant variable before and after the reform for a group of companies in the presence of the tax reform and for the same group of companies in absence of this reform. However, the study is not possible to do in these terms. Considering the tax reform is exogenous, we can determine a treatment group, which is composed of Belgian companies affected by the reform, and a control group, which is constituted by companies of a country where the fiscal legislation did not change. This control group is a proxy to the Belgian companies if there had been no change in legislation. We used French companies as a control group because France, unlike Belgium, has a traditional tax system, which allows the tax deduction of interest expenses but not the capital cost of equity. In addition, France did not have a major tax reforms around 2006, is a neighboring country of Belgium, both countries belong to the same economic space and share the same currency, which makes them more likely to be exposed to the similar shocks. In this way, we will use a difference-in-difference identification strategy to ensures that the estimates obtained will not be influenced by permanent differences between the treatment and the control group or by shared trends (Schepens, 2016).

To obtain reliable estimates by the difference-in-difference method is necessary verify two fundamental assumptions. The first assumption states capital structure trends of the treatment and control group should be similar in the pre-treatment period. This assumption is called a parallel trend and implies in the absence of treatment the mean result for both groups would have followed same trend over time. The second assumption states both groups have the same characteristics in the pre-treatment period. As a result, according Princen (2012), the significant differences between the two groups are attributed to the tax reform. Thus, the credibility of the results obtained by difference-in-difference methodology is dependent on the control group used and whether it accurately represents the treatment group in the absence of the treatment.

To verify the above assumptions, we use the nearest neighbor matching procedure to construct the control group. This procedure states for a given treatment company is selected a control company whose propensity score matching value is the closest of the treatment company (Rosenbaum & Rubin, 1983).

The propensity score matching is estimated using a probit regression for the full 2005 sample

where the dependent variable is a dummy equal to one for Belgian companies. In order to make more probable to verify the first assumption, we include the 2004 and 2005 leverage ratio as explanatory variables. In addition, we also include a set of control variables related to firm specific characteristics, namely: tangibility, profitability, size, growth opportunities, NDTS and industry dummy variables based on two-digit Sic Code. This set of control variables ensure that treatment and control group have similar characteristics and to make more likely the second assumption. At the end, for each Belgian company are selected three French companies with identical characteristics according to their propensity score. This matching is made with replacement[5], which means a French company can be select for several Belgian companies. Thus, the final sample covers 66 Belgian companies and 198 French companies.

[5] Matching with replacement consists of the combination of each treatment observation with the closest control observation, thus a control observation can be repeatedly used. Therefore, on the one hand, the order in which the treated observations are matched has no effect on the formation of the matched pairs, which may reduce bias and allows for more successful matches. On the other hand, matching with replacement can decrease the representativeness of the control group and increase the sampling variance. However, this problem may be mitigated by increasing the sample size using a "one-to-many" correspondence, where one treatment observation is matched to many control observations (Austin, 2014; Shipman, Swanquist, & Whited, 2017).

5. Empirical results

In this section we present the empirical results of the study. Initially, the univariate results are presented. Subsequently, using a difference-in-difference approach, we analyse the differences in leverage ratios between Belgian and control companies to study the impact of the NID on capital structure. Finally, additional robustness tests are performed to verify the consistency of the results obtained.

5.1. Univariate results

The descriptive statists of the main variables of the analysis are presented in Table 1. The Panel A of Table 1 illustrate the impact of the matching procedure, showing summary statistics for the pre-treatment period (2002-2005) for Belgian companies, the full sample of French companies and the selected control group. Thus, it is possible verify that the parallel trends assumption is breached when considering full sample of French companies because the leverage ratio of the full sample of French companies is significantly different from the leverage ratio of the Belgian companies, and the same is true for all other characteristics. For example, treatment group companies are significantly more leveraged (26% versus 23%), which shows that control group companies have a more balanced capital structure. In case of the specific characteristics of the companies, profitability, weight of the tangible assets in total assets and size of the Belgian companies tend to be significant higher to French companies. These significant differences justify the use of a matching method to properly apply the difference-in-difference strategy.

However, for the results of the difference-in-difference model to be reliable is necessary to evaluate the success of the matching procedure. For this, we will use two indicators used by Schepens (2016): "% change bias" and P-values of a T-test.

The first indicator shows the bias change after matching, where bias is defined by Rosenbaun and Rubin (1985) as the percentage difference of the means in the treated and non-treated groups as a percentage of the square root of the average of the sample variances in the treated and non-treated groups. The values of "Bias full" and "Bias matched" shows a reduction in bias between the treatment group and, respectively, the full sample of French companies and the control group. In addition, the "% changes bias" indicator has a positive value to all variables which implies a reduction in the bias after matching, showing an

Table 1: Impact of the matching procedure and summary statistics

This table provides summary statistics and matching diagnostics for the pre-treatment period (2002-2005) (Panel A) and the summary statistics for the post-treatment period (2006-2011) (Panel) B for the main variables used in the study. The first part of Panel A shows the descriptive statistics for the Belgian companies (treatment group), the second for the full sample of French companies (full sample) and third for the French companies selected for the control group (control group). In relation to the second and third parts: the column Diff. shows the value of the difference between, respectively, the mean of full sample or control group and the mean of treatment group; the fifth column shows the p-value for the t-test which verifies if, respectively, the average of full sample or control group is equal to the average of the treatment group; the "Bias full" and "Bias matched" columns indicate the standardized percentage bias between the treatment group and, respectively, the full sample of French companies and French companies selected for the control group. Where bias is defined by Rosenbaum and Rubin (1985) as the percentage difference of the means in the treated and non-treated groups as a per-centage of the square root of the average of the sample variances in the treated and non-treated groups. The last column, % change in bias, shows the percentage change in bias after the matching procedure, where a positive value indicates that averages of the treatment and control group are closer after matching.

Panel A: Matching Procedure diagnostics

	Treatment group			Full sample						Control group						
	N	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**Diff.**	**P-value**	**Bias full**	**N**	**Mean**	**Std. Dev.**	**Diff.**	**P-value**	**Bias matched**	**%change in bias**
Leverage	264	0,26	0,19	1820	0,23	0,17	-0,03	0,02	16,71	792	0,27	0,19	0,00	0,84	-1,41	91,54
Profitability	264	0,13	0,13	1820	0,10	0,12	-0,03	0,00	22,50	792	0,13	0,12	0,00	0,64	-3,16	85,95
Tangibility	264	0,31	0,21	1820	0,19	0,17	-0,12	0,00	62,65	792	0,30	0,23	-0,01	0,47	5,30	91,54
Growth opportunities	264	0,03	0,22	1820	0,07	0,26	0,03	0,04	-14,27	792	0,07	0,22	0,03	0,05	-13,96	2,18
Size	264	12,57	1,76	1820	12,04	2,36	-0,52	0,00	25,22	792	12,64	2,29	0,07	0,63	-3,64	85,58
NDTS	264	0,07	0,04	1820	0,06	0,05	-0,01	0,02	16,95	792	0,06	0,05	-0,01	0,02	17,18	-1,35

Panel B: Post-treatment summary statistics

	Treatment group						Control group					
	N	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev.**	**N**	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev.**
Leverage	386	0,23	0,23	0,84	0,00	0,16	1149	0,26	0,24	0,86	0,00	0,19
Profitability	384	0,12	0,12	0,50	-0,40	0,12	1140	0,12	0,11	0,50	-0,40	0,09
Tangibility	386	0,29	0,24	0,87	0,00	0,21	1149	0,29	0,27	0,83	0,00	0,22
Growth opportunities	385	0,06	0,04	1,28	-0,45	0,22	1148	0,07	0,04	1,28	-0,45	0,21
Size	386	12,89	12,45	18,18	9,23	1,81	1149	13,00	12,89	18,18	7,58	2,27
NDTS	385	0,05	0,04	0,22	0,00	0,03	1149	0,04	0,04	0,27	0,00	0,03

approximation of the mean between the two group. In the case of leverage this reduction is 92% and between 2% and 86% for most remaining variables. The only exception is the case of NDTS for which bias after matching has increased 1%. Finally, the P-values of a T-test on the averages show that the means for the most variables are significantly different when comparing the treatment group and the full sample, e.g. profitability, tangibility and size. However, after matching procedure, the differences between the variables in the Belgian companies and French control companies are less significant. In conclusion, as the variables follow a similar trend and characteristics in the pre-treatment period, it is more likely that the parallel trend assumption is verified and, consequently, the difference-in-difference estimates are more reliable.

The Panel B of Table 1 provides descriptive statistics for the post-treatment period (2006-2011) for Belgian treatment companies and French control companies. These statistics show a reduction in average leverage ratio for both groups, but this reduction is more pronounced for Belgian companies (26% to 23% versus 27% to 26%). In addition, Figure 1 present the evolution of the average leverage ratio for Belgian companies and control companies between 2002 and 2011. This figure shows a similar trend of the leverage ratio for both group during the pre-treatment period and a lower leverage ratio for the Belgian group compared to control group in the post-treatment period.

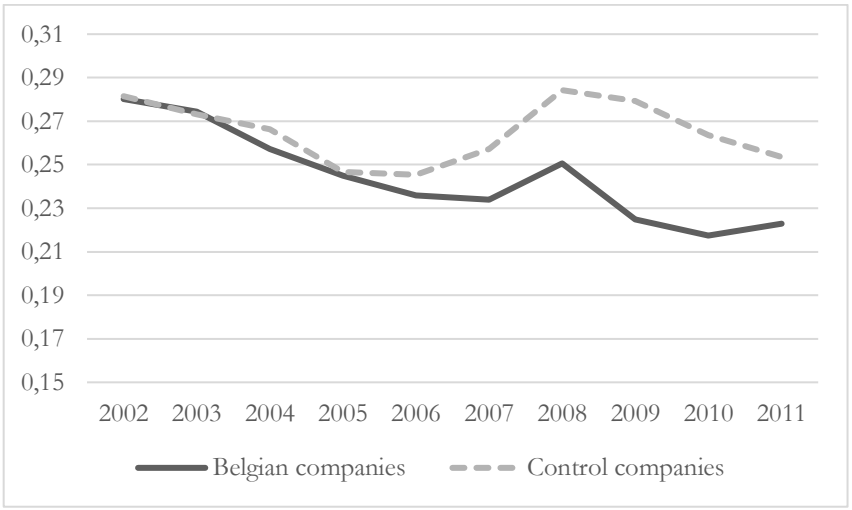

Figure 1: Evolution of the leverage ratio for the Belgian companies and the control companies over time

5.2. Multivariate results

It is intended now to evaluate the impact of the NID on the capital structure of Belgian companies. Table 2 summarizes the results for difference-in-difference analysis, which compares the leverage ratios of the Belgian companies with those of the control group of French companies. Column 1 of Table 2 shows the results of base regression. The results show a non-significant reduction in leverage in the post-treatment period. However, the coefficient of the interaction term, interest variable, is negative of -0.0236 and significant at the 1% level, which suggests that this reduction was more pronounced for Belgian companies. This indicates that, the leverage ratio for Belgian companies decreased significantly compared with one would expect without the tax reform. As the sample period includes the crisis period, in Column 2 is added the Crisis variable which capture other shocks related to the crisis that have an impact on corporate capital structure. On the one hand, the main result remains, and, on the other hand, the coefficient of the Crisis variable is positive and significant at the 10% level, indicating the crisis has a positive impact in leverage.

Next, we add a set of firm-specific and macroeconomic control variables so that we make sure they not change the previous results. The results are presented in Columns 3-4 and show that the coefficient of interest variable continuous negative and significant of -0.0136 and -0.0178, respectively. In addition, regarding to the firm-level variables, tangibility, growth opportunities and size has a positive and significant impact on leverage and profitability also has a significant but negative impact. This provides support for H3, H4, H5 and H2, respectively. This means that companies with more tangible assets, more growth opportunities, more total assets and less profitable use more debt than capital. Finally, the results show that firms with higher NDTS are more leveraged, which do not give support to H6. A possible reason for this result is that depreciations are both a proxy for NDTS and an indicator of assets. If depreciations are high, assets must be replaced more quickly requiring significant funding (Bradley et all, 1984). Regarding to the effect of the crisis, the results of columns 3 and 4 show a negative impact of the crisis on corporate leverage, not significant for the first and significant at the 5% level for the second.

Thus, the results of Table 2 illustrate that the introduction of the NID had a significant impact on corporate capital structure. This fiscal reform reduced the discrimination between debt and equity which allowed the decrease in leverage compared with what would

Table 2: Impact of the NID on capital structure

This table analyses the impact of the NID in the leverage, using a difference-in-difference strategy for Belgian and French data. The dependent variable is Leverage defined as total debt divided by total assets. Treated is a dummy variable equal to one for Belgian firms and zero otherwise; Post is a dummy variable equal to one for the post-treatment period (2006-2011), zero otherwise; interaction term between Treated and Post dummies captures the impact of the NID; Crisis is a dummy variable equal to one for the post-crisis period (2008-2011), zero otherwise; Profitability (PROF) is defined as earnings before interest, taxes, depreciation and amortization (EBITDA) divided by total assets; Tangibility (TANG) is defined as property, plant and equipment divided by total assets; Size (SIZE) defined as the logarithm of total assets; Non debt tax shield (NDTS) is defined as depreciation, depletion and amortization divided by total assets; GDP per capita (GDPpc) is measured by Word Bank, GDP growth per capita (GDPpc growth) is the annual percentage of GDP per capita growth as measured by the World Bank and Inflation is the annual percentage of inflation in consumer prices as measured by the World Bank. The industry dummy variables are based on two-digit SIC codes. The regressions are estimated by Generalized Least Squares (GLS) cross-section weights. The sample period is 2002-2011. Coefficients and standard errors are reported. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	(1) Leverage		(2) Leverage		(3) Leverage		(4) Leverage	
Treated * Post	-0,0236	***	-0,0237	***	-0,0136	**	-0,0178	***
	(0,0057)		(0,0058)		(0,0057)		(0,0060)	
Post	-0,0068		-0,0122	**	-0,0134	***	0,0075	
	(0,0042)		(0,0054)		(0,0050)		(0,0068)	
Crisis			0,0100	*	-0,0046		-0,0153	**
			(0,0053)		(0,0049)		(0,0064)	
PROF					-0,5259	***	-0,5263	***
					(0,0224)		(0,0224)	
TANG					0,2347	***	0,2372	***
					(0,0112)		(0,0111)	
GRO					0,0403	***	0,0445	***
					(0,0101)		(0,0102)	
SIZE					0,0122	***	0,0124	***
					(0,0009)		(0,0009)	
NDTS					0,3508	***	0,3409	***
					(0,0678)		(0,0673)	
Ln(GDP per capita)							-0,0471	***
							(0,0177)	
GDP per capita _ growth							-0,0060	***
							(0,0016)	
Inflation							0,0118	***
							(0,0028)	
Constant	0,2573	***	0,2567	***	0,1036	***	0,5701	***
	(0,0124)		(0,0122)		(0,0168)		(0,1827)	
Observations	2591		2591		2578		2578	
Number of firms	264		264		264		264	
Adjusted R-squared	0,251		0,255		0,492		0,500	
Industry Dummies	Yes		Yes		Yes		Yes	

be expected without the reform. This result is consistent with the theorical prediction. As such, reforms that drive the reduction of the relative tax advantage of the debt can be used to induce a decrease in leverage in counties with high levels of corporate leverage.

The results also show contradictory effects on the impact of the crisis on leverage. However, the previous literature is also not unanimous about the effect of the crisis on corporate capital structure.

However, the decrease in leverage may be driven by a decrease in debt as a result of the implementation of the NID or by an increase in assets promoted by an increase in activity. Thus, we investigated the factors that generated the change in leverage ratio and the results are presented in Table 3. The first column indicates that the decrease of leverage ratio is driven by a decrease in total debt. The results show that Belgian companies have on average 19.51%[6] less debt during the post-treatment period compared with would one expected had the measure not been applied.

It is to be expected that firms have different reactions to the introduction of the NID because they have different corporate strategies concerning debt maturity, for example. The total debt contains the long-term and the short-term debt. Therefore, the second and third columns consider the logarithm of the long-term debt (Ln(LTD)) and the logarithm of the short-term debt (Ln(STD)), respectively. The results indicate that the decrease of the total debt is essentially due to the decrease of the short-term debt. Short-term debt needs to be renewed more frequently and transaction costs related to this type of debt are lower, which explains the greater reactivity of short-term debt to the introduction of the NID and, consequently, the results obtained (Kestens et al., 2012).

Finally, Column 4 confirms that the decrease in leverage was not due to an increase in activity because it shows that there was a decrease in total assets. Therefore, the results in Table 3 indicate that the decrease in leverage after the introduction of the NID is driven by a decrease in debt instead of an increase of activities, which suggest that the measure served the purpose for which it was introduced.

[6] Because the dependent variable is log transformed it is not possible to directly interpret the coefficient of the dummy independent variable. Thus, for a correct interpretation Kennedy (1981) propose the following transformation: $\hat{p}=100*(\exp(\hat{c}-0.5*\hat{V}(\hat{c}))-1)$ where $\hat{p}$ is the percentage change in the dependent variable given a change in the dummy variable from zero to one, $\hat{c}$ is the coefficient estimate for the dummy variable and $\hat{V}(\hat{c})$ is the estimated variance for this coefficient.

Table 3: Leverage ratio components

This table reports the factors underlying of the leverage ratio after the introduction of the NID. Columns 1, 2 and 3 analyze the impact of the NID on the debt side, using as depend variable the logarithm of total debt (Ln(Total Debt)), the logarithm of long-term debt (Ln(LTD)) and the logarithm of short-term debt (Ln(STD)), respectively. While column 4 analyzes the impact of the NID on the assets side, using the logarithm of total assets (Ln(Total Assets)) as the dependent variable. Treated is a dummy variable equal to one for Belgian firms and zero otherwise; Post is a dummy variable equal to one for the post-treatment period (2006-2011), zero otherwise; interaction term between Treated and Post dummies captures the impact of the NID; Crisis is a dummy variable equal to one for the post-crisis period (2008-2011), zero otherwise. The industry dummy variables are based on two-digit SIC codes. The regressions are estimated by Generalized Least Squares (GLS) cross-section weights. The sample period is 2002-2011. Coefficients and standard errors are reported. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	(1) LN(Total Debt)		(2) LN(LTD)		(3) LN(STD)		(4) Ln(Total Assets)	
Treated*Post	-0,2156	***	-0,0885		-0,3624	***	-0,1707	***
	(0,0545)		(0,0601)		(0,0674)		(0,0331)	
Post	0,3479	***	0,2782	***	0,2889	***	0,3276	***
	(0,0485)		(0,0659)		(0,0568)		(0,0294)	
Crisis	0,1805	***	0,0819		0,1086	*	0,0880	***
	(0,0473)		(0,0610)		(0,0555)		(0,0289)	
Constant	11,0778	***	10,0037	***	10,6999	***	12,5664	***
	(0,2110)		(0,3548)		(0,1696)		(0,1387)	
Observations	2591		2591		2569		2590	
Number of firms	264		264		264		264	
Adjusted R-squared	0,283		0,242		0,148		0,529	
Industry Dummies	Yes		Yes		Yes		Yes	

5.3. Robustness tests

In this subsection, we used several robustness tests to ensure that main results do not depend on the matching procedure or the sample. The configuration used is similar to Column 4 in Table 2 and the results are reported in Table 4.

In Columns 1 and 2 of Table 4, we changed the number of matched firms to evaluate if the number of matches influences the results. In Column 1 and 2 we used one and five matches for each Belgian company, respectively. The results show a negative and significant impact of the tax change on corporate leverage, with a coefficient for the interaction term of -0.0189 for Column 1 and -0.0205 for Column 2. This indicates that the results are consistent and do not depend on the number of matches.

To ensure that the matching procedure did not change the regression results, in the third column of Table 4 we used unmatched data, using the full sample of French companies. The

regression results continue to show a negative and significant impact of the NID on leverage, which indicates that the matching procedure does not change the main results.

Finally, in Column 4 we used an additional control group of German companies, to ensure that the results are not country-specific. When we used German companies as control group, we found again a negative coefficient for the interaction term, but weaker compared to that obtained for identical specification for the French control group (-0.0106 versus -0.0178). In addition, the results are only significant at the 10% level.

Thus, the change in the number of matched firms, the use of unmatched sample and the consideration of a different control group does not change the main results, indicating that the results obtained are robust.

Table 4: Robustness tests

This table reports the results of the leverage regression, using a difference-in-difference strategy to test the robustness of the results. The robustness checks of columns 1 and 2 use one or five control companies for each treatment company, respectively. Column 3 is based on full sample of French firms. Column 4 uses German firms as a control group. The dependent variable is Leverage defined as total debt divided by total assets. Treated is a dummy variable equal to one for Belgian firms and zero otherwise; Post is a dummy variable equal to one for the post-treatment period (2006-2011), zero otherwise; interaction term (Treated*Post) captures the impact of the NID; Crisis is a dummy variable equal to one for the post-crisis period (2008-2011), zero otherwise; Profitability (PROF) is defined as earnings before interest, taxes, depreciation and amortization divided by total assets; Tangibility (TANG) is defined as property, plant and equipment divided by total assets; Size (SIZE) defined as the logarithm of total assets; Non-debt tax shield (NDTS) is defined as depreciation, depletion and amortization divided by total assets; GDP per capita (GDPpc) is measured by Word Bank, GDP growth per capita (GDPpc growth) is the annual percentage of GDP per capita growth as measured by the World Bank and Inflation is the annual percentage of inflation in consumer prices as measured by the World Bank. The industry dummy variables are based on two-digit SIC codes. The regressions are estimated by Generalized Least Squares (GLS) cross-section weights. Coefficients and standard errors are reported. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	(1)		(2)		(3)		(4)	
	1 Match		5 Match		Full Sample		Germany	
Treated * Post	-0,0189	***	-0,0205	***	-0,0199	***	-0,0106	*
	(0,0069)		(0,0057)		(0,0053)		(0,0063)	
Post	0,0102		0,0103	*	0,0071		-0,0111	**
	(0,0086)		(0,0056)		(0,0045)		(0,0050)	
Crisis	-0,0042		-0,0191	***	-0,0164	***	-0,0173	***
	(0,0083)		(0,0052)		(0,0042)		(0,0049)	
PROF	-0,3792	***	-0,4758	***	-0,3784	***	-0,3736	***
	(0,0271)		(0,0186)		(0,0139)		(0,0155)	
TANG	0,1891	***	0,2562	***	0,2504	***	0,3754	***
	(0,0190)		(0,0085)		(0,0078)		(0,0114)	
GRO	0,0258	*	0,0308	***	0,0333	***	0,0121	
	(0,0154)		(0,0085)		(0,0060)		(0,0099)	
SIZE	0,0134	***	0,0099	***	0,0134	***	0,0046	***
	(0,0013)		(0,0007)		(0,0006)		(0,0009)	
NDTS	0,4482	***	0,3597	***	0,4796	***	-0,1092	
	(0,1028)		(0,0518)		(0,0353)		(0,0674)	
ln(GDP per capita)	-0,0317		-0,0590	***	-0,0174		0,0024	
	(0,0203)		(0,0146)		(0,0119)		(0,0112)	
GDP per capita _ growth	-0,0007		-0,0072	***	-0,0051	***	-0,0017	**
	(0,0020)		(0,0013)		(0,0011)		(0,0007)	
Inflation	0,0048		0,0149	***	0,0112	***	0,0060	**
	(0,0032)		(0,0024)		(0,0020)		(0,0026)	
Constant	0,3636	*	0,6896	***	0,1844		0,0428	
	(0,2128)		(0,1505)		(0,1232)		(0,1193)	
Observations	1292		3861		4805		2584	
Number of firms	132		396		497		264	
Adjusted R-squared	0,613		0,485		0,423		0,479	
Industry Dummies	Yes		Yes		Yes		Yes	

6. Conclusion

The most of tax systems around the world allow the deduction of interest for tax purposes, while the same is not true for equity. Thus, it is more favourable for companies to use debt financing to finance their investments, which can lead to excessive leverage by companies. In this wise, the aim of this dissertation is to study the impact of reduction of the tax discrimination between debt and equity on corporate capital structure. For this, we use an exogenous variation in the Belgian tax legislation in 2006, called notional interest deduction. It consists in the introduction of a tax deduction for equity due to the application of a notional interest rate on equity, which reduces the tax discrimination between debt and equity.

To analyse the impact of this measure on corporate leverage, we use a difference-in-difference regression which compares the evolution of the leverage ratio of Belgian companies with a control group of French companies before and after the introduction of the NID. In addition, we use panel data and a GLS cross-section weights estimator. The sample is composed of 2 281 (310 Belgian and 1 971 French) listed on the Euronext Liffe Brussels for Belgium and on the Euronext Liffe Paris for France during the period of 2002 to 2011.

The main results of this study indicate that the reduction of the tax discrimination between debt and equity have a significant impact on the corporate capital structure decisions. The analysis on NID introduction in Belgium showed that the tax deduction for equity had a negative and significant impact on corporate leverage ratio. However, the decrease in leverage ratio can be due to the decrease in debt or the increase in assets, for that reason it is important to study the factors that drive the change in leverage. The results indicate that this change is driven by a decline in debt, mainly due to the reduction of short term debt, and not by an increase of assets. These findings indicate that the reduction in leverage is more likely to be driven by the decrease in the relative debt attractiveness. Finally, we do additional robustness tests to evaluate if the main results do not depend on the matching procedure or the sample, which confirmed the findings.

Overall, the results contribute to the literature about the impact of the taxes on corporate capital structure. They suggest that the reduction of the tax discrimination between debt and equity can be an important tool for reducing leverage ratio in countries with high levels of corporate leverage.

However, the sample used is reduced which may limit our study. Moreover, with the recent introduction of ACE systems in several countries, it would be important to evaluate the impact of these implementations on corporate capital structure, which could be further explored in future researches.

References

Akbar, S., Rehman, S. u., & Ormrod, P. (2013). The impact of recent financial shocks on the financing and investment policies of UK private firms. *International Review of Financial Analysis, 26*, 59-70. doi:10.1016/j.irfa.2012.05.004

Alves, P., & Francisco, P. (2015). The impact of institutional environment on the capital structure of firms during recent financial crises. *Quarterly Review of Economics and Finance, 57*, 129-146. doi:10.1016/j.qref.2014.12.001

Andries, K., Cools, M., & Van Uytbergen, S. (2017). To Shift or Not To Shift? Intertemporal Income Shifting as a Response to the Risk Capital Allowance Introduction in Belgium. *European Accounting Review, 26*(3), 531-559. doi:10.1080/09638180.2016.1202854

Austin, P. C. (2014). A comparison of 12 algorithms for matching on the propensity score. *Statistics in Medicine, 33*(6), 1057-1069. doi:10.1002/sim.6004

Boadway, R., & Bruce, N. (1984). A GENERAL PROPOSITION ON THE DESIGN OF A NEUTRAL BUSINESS TAX. *Journal of Public Economics, 24*(2), 231-239. doi:10.1016/0047-2727(84)90026-4

Bordignon, M., Giannini, S., & Panteghini, P. (2001). Reforming business taxation: Lessons from Italy? *International Tax and Public Finance, 8*(2), 191-210. doi:10.1023/a:1011224815442

Bradley, M., Jarrell, G. A., & Kim, E. H. (1984). ON THE EXISTENCE OF AN OPTIMAL CAPITAL STRUCTURE - THEORY AND EVIDENCE. *Journal of Finance, 39*(3), 857-878. doi:10.2307/2327950

de Miguel, A., & Pindado, J. (2001). Determinants of capital structure: new evidence from Spanish panel data. *Journal of Corporate Finance, 7*(1), 77-99. doi:10.1016/s0929-1199(00)00020-1

De Mooij, R. A. (2012). Tax Biases to Debt Finance: Assessing the Problem, Finding Solutions. *Fiscal Studies, 33*(4), 489-512. doi:10.1111/j.1475-5890.2012.00170.x

Devereux, M., & Freeman, H. (1991). A General Neutral Profits Tax. *Fiscal Studies, 12*(3), 1-15. doi:10.1111/j.1475-5890.1991.tb00158.x

Faccio, M., & Xu, J. (2015). Taxes and Capital Structure. *Journal of Financial and Quantitative Analysis, 50*(3), 277-300. doi:10.1017/s0022109015000174

Geert Van, C., & Tom Van, C. (2013). How did the notional interest deduction affect Belgian

SMEs' capital structure? *Small Business Economics*(2), 351. doi:10.1007/s11187-011-9364-1

González, V. M. (2015). The financial crisis and corporate debt maturity: The role of banking structure. *Journal of Corporate Finance, 35*(Supplement C), 310-328. doi:https://doi.org/10.1016/j.jcorpfin.2015.10.002

Harris, M., & Raviv, A. (1991). THE THEORY OF CAPITAL STRUCTURE. *Journal of Finance, 46*(1), 297-355. doi:10.1111/j.1540-6261.1991.tb03753.x

Harrison, B., & Widjaja, T. W. (2014). The Determinants of Capital Structure: Comparison between before and after Financial Crisis. *Economic Issues, 19*(2), 55-82. doi:http://www.economicissues.org.uk/

Keen, M., & King, J. (2002). The Croatian profit tax: An ACE in practice. *Fiscal Studies, 23*(3), 401-418.

Kestens, K., van Cauwenbergeo, P., & Christiaens, J. (2012). The effect of the notional interest deduction on the capital structure of Belgian SMEs. *Environment and Planning C: Government and Policy, 30*(2), 228-247. doi:10.1068/c1163b

Klemm, A. (2007). Allowances for corporate equity in practice. *Cesifo Economic Studies, 53*(2), 229-262. doi:10.1093/cesifo/ifm007

Kraus, A., & Litzenberger, R. H. (1973). STATE-PREFERENCE MODEL OF OPTIMAL FINANCIAL LEVERAGE. *Journal of Finance, 28*(4), 911-922. doi:10.2307/2978343

Miller, M. H. (1977). DEBT AND TAXES. *Journal of Finance, 32*(2), 261-275. doi:10.2307/2326758

Modigliani, F., & Miller, M. H. (1958). THE COST OF CAPITAL, CORPORATION FINANCE AND THE THEORY OF INVESTMENT. *American Economic Review, 48*(3), 261.

Modigliani, F., & Miller, M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *American Economic Review, 53*(3), 433.

Myers, S. C. (1984). THE CAPITAL STRUCTURE PUZZLE. *Journal of Finance, 39*(3), 575-592. doi:10.2307/2327916

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics, 13*(2), 187-221. doi:https://doi.org/10.1016/0304-405X(84)90023-0

Princen, S. (2012). Taxes do affect corporate financing decisions: the case of Belgian ACE. *CESifo Working Papers - 3713*.

Rajan, R. G., & Zingales, L. (1995). What Do We Know about Capital Structure? Some Evidence from International Data. *The Journal of Finance, 50*(5), 1421-1460. doi:10.2307/2329322

Rosenbaum, P. R., & Rubin, D. B. (1983). THE CENTRAL ROLE OF THE PROPENSITY SCORE IN OBSERVATIONAL STUDIES FOR CAUSAL EFFECTS. *Biometrika, 70*(1), 41-55. doi:10.2307/2335942

Rosenbaum, P. R., & Rubin, D. B. (1985). CONSTRUCTING A CONTROL-GROUP USING MULTIVARIATE MATCHED SAMPLING METHODS THAT INCORPORATE THE PROPENSITY SCORE. *American Statistician, 39*(1), 33-38. doi:10.2307/2683903

Schepens, G. (2016). Taxes and bank capital structure. *Journal of Financial Economics, 120*(3), 585-600. doi:10.1016/j.jfineco.2016.01.015

Shipman, J. E., Swanquist, Q. T., & Whited, R. L. (2017). Propensity score matching in accounting research. *Accounting Review, 92*(1), 213-244. doi:10.2308/accr-51449

Titman, S., & Wessels, R. (1988). THE DETERMINANTS OF CAPITAL STRUCTURE CHOICE. *Journal of Finance, 43*(1), 1-19. doi:10.2307/2328319

Zeitun, R., Temimi, A., & Mimouni, K. (2017). Do financial crises alter the dynamics of corporate capital structure? Evidence from GCC countries. *Quarterly Review of Economics and Finance, 63*, 21-33. doi:10.1016/j.qref.2016.05.004

FACULDADE DE **ECONOMIA**